

Case Study

More Elasticity for the Heavy Haul Malmbanan Line (SE)



» First major project with under sleeper pads for heavy haul

» Significantly improved service life and track bed quality

» Effective protection of the ballasted track



A Convincing Argument: Under Sleeper Pads under Extreme Conditions

Description of the project

Particularly in heavy haul, ballasted track often reaches its limits. High axle loads and freight tonnage directly place a disproportionately high strain on the track. For this reason the Swedish operator Trafikverket opted to install under sleeper pads in 2014.

Trafikverket, the Swedish Transport Administration, is responsible for all transportation matters. In addition to the planning, constructing and maintaining the road network, it is also the body in charge of expanding and maintenance of the rail infrastructure.

This also includes the Swedish section of the heavy haul line from Luleå to Narvik. The world's northernmost electrified railway line is more than 473 km long and is mainly used to transport iron ore and pellets from the mines in Kiruna and Malmberget to the harbours.

High frequency, high tonnage

In addition to passenger and freight trains, heavy haul trains belonging to Swedish iron ore mine owner LKAB (Luossavaara-Kiirunavaara Aktiebolag) also run on the line. The heavy haul trains with up to 68 wagons and

an axle load of 30 metric tons run on the southeastern section in Sweden (Malmabanan Line) at 60 km/h when loaded and at 70 km/h when unloaded. Weighing roughly 8,500 metric tons, the fully loaded trains have an impressive size, measuring up at nearly 750 metres.

Loads far beyond the design

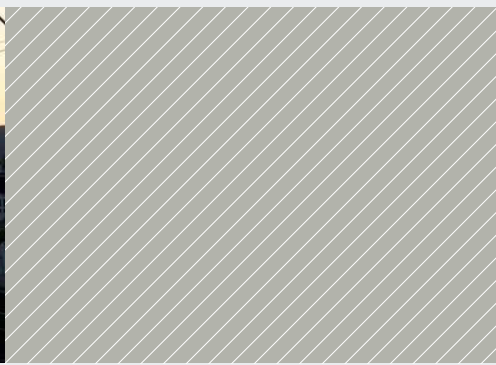
Due to the ever increasing mining of iron ore, the traffic volume has increased steadily over the past few years and a further increase in live loads is expected. The problem is that, when the track was constructed in the 1960s, it was designed for an axle load of no more than 25 metric tons. Since 2000 however, the track section between Narvik and Kiruna has permitted a load of 30 metric tons. Despite using high-grade rail steels and sleepers made of pre-stressed concrete, this has caused above-average amounts of wear. Consequently, the ballast is the weakest link in the railway track. Trafikverket needed a solution. Thanks to Getzner, they found one.

The Getzner solution

Under sleeper pads with special properties

Getzner and Trafikverket are bound by their close collaboration on several projects with mass-spring systems, under ballast mats and also joint research projects. Trafikverket knew that under sleeper pads help significantly to protect the ballast. But no-one had ever tested whether this solution would work as efficiently and on this scale north of the arctic circle before. The ideal load distribution within the track was required. This was the goal behind the attempt to reduce the stress between ballast and sleeper by enlarging the area of contact between the sleeper and the ballast. Under sleeper pads, such as those offered by Getzner, are perfect for such a scenario.





»» *At Getzner, the message came through loud and clear: we needed to combine both resilient and plastic properties in our under sleeper pads.*

Plastic and yet resilient

The special challenge lay in combining plastic and resilient properties. In addition to the resilience, plastic under sleeper pads – which allow the gentlest possible bedding of the ballast grains – are required to enlarge the area of contact between the underside of the sleeper and the uppermost layer of ballast.

Getzner's solution for Trafikverket shows that these two properties do not have to be a contradiction in terms.

Concrete sleepers instead of timber sleepers

When the track section between Gällivare and Koskullskulle was renewed, Trafikverket replaced the timber

sleepers with padded concrete sleepers. Based on the knowledge gained from test tracks and international experiences, Trafikverket opted for concrete sleepers with under sleeper pads made from Sylomer®. The concrete sleepers were fitted with type SLB 2210G under sleeper pads from Getzner.

Impressive results

Since 2014, around 20,000 padded concrete sleepers have been installed on approx. 12 km of track. Trafikverket therefore expects significantly greater availability along this section of track, coupled with a lower maintenance requirement.

First major project with under sleeper pads for heavy freight operations

For Getzner this project was a double success. In addition to another satisfied customer, this is also the first major project for under sleeper pads on a heavy freight line under arctic conditions.



Advantages

- Effective protection of the ballasted track
- Thus, increased availability and profitability
- Less maintenance work required
- Significantly lower life cycle costs
- Improved track bed quality
- Reduction of short-pitch/rail corrugation on rails in tight curves
- Reduction of vibration emissions
- Prevention of voids under the sleepers



Facts and figures at a glance

Line mileage (over which the material was installed):	12 kilometres
Operator:	Trafikverket
Material required:	20,000 under sleeper pads of type SLB 2210G
Axle loads on the heavy haul line:	30 metric tons

Getzner Werkstoffe GmbH

Founded:	1969 (as a subsidiary of Getzner, Mutter & Cie)
Chief Executive Officer:	Jürgen Rainalter
Employees:	490 (360 in Bürs)
2018 turnover:	EUR 100.3 million
Business areas:	Railway, construction, industry
Headquarter:	Bürs (AT)
Locations:	Berlin (DE), Munich (DE), Stuttgart (DE), Lyon (FR), Amman (JO), Tokyo (JP), Pune (IN), Beijing (CN), Kunshan (CN), Charlotte (US), Decatur (US)
Ratio of exports:	93 %



Find out more at
www.getzner.com/heavy-haul

